

DRDO

NEWSLETTER



A Monthly Bulletin of Defence Research and Development Organisation

www.drdo.gov.in

JULY 2017

VOLUME 37

ISSUE 7

RM DEDICATES AERONAUTICAL TEST RANGE TO THE NATION



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VOLUME 37 | ISSUE 7
ISSN: 0971-4391

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Defence Research & Development Organisation

FROM THE DESK OF THE CHAIRMAN



Dr S Christopher

CHAIRMAN

Defence Research & Development Organisation

&

SECRETARY

Department of Defence Research & Development

My dear friends,

When you perform well, the challenge doesn't end there. Expectation levels go high and people expect you to perform miracles. In its journey of 60 years, DRDO has seen many ups and downs. Each success has motivated us to do better and each failure has made us to do soul searching to succeed in next attempt. The journey continues with each member of 'Team DRDO' excelling the other in getting the miracles. During the last three years, Team DRDO has proved its mettle. Each month has virtually witnessed induction of new products, major launches, TOTs and many more, resulting in a sense of satisfaction and making us proud. The flagship program "Make In India" launched by Hon'ble PM has opened plenty of opportunities to DRDO. A phenomenal 60% growth in production value of DRDO developed products cleared by DAC during 2014-2017 speaks volumes about our achievements. The three new centres of excellence at IIT Mumbai, IIT Delhi and Jadavpur University, Kolkata, would provide ample opportunity to our scientists to rub shoulder with young talented brains of our country to explore the new frontiers of Science & Technology, a visionary step towards making of New India.

In the just broadcast 'Mann ki Baat' on 25th June, our Hon'ble PM has stressed the need for giving books in place of bouquets during events. A nice gesture indeed! Can we follow it, in letter and spirit? This would definitely enhance our level of knowledge and expression. Going a step further, the PM has asked all Govt Departments to visit GeM – Government e-Market place website (<https://gem.gov.in>), a great new system for procurement of any items in the offices. We must adopt it to enhance transparency, efficiency and speed in our procurement processes.

I would like to compliment a member of DRDO family for winning the coveted "Miss India World -2017" title. Ms Manushi Chhillar is the daughter of Dr Mitra Basu of INMAS. Her final answer "Throughout the journey, I had a vision and with this came a belief, I can change the world", was applauded by all and won her the title. As I earlier said, believe in yourself. Our former President and Chief Dr Kalam said "Dream is not that which you see while sleeping, it is something that does not let you sleep!" Friends, dream..... a really big dream. Go confidently in pursuit of your dreams. Success will be under your feet. This is what I want from everyone in our DRDO family.

Monsoon is approaching and I expect each member of DRDO family to plant at least one sapling and watch it grow in front of your eyes. Believe me; it would give immense pleasure and satisfaction. An event to plant over a thousand saplings has been planned at Bengaluru and I expect all labs to follow suit this season. This may be a small gesture from an individual but collectively as team DRDO, it would make a huge difference to environment and our lives.

Jai Hind.

RAKSHA MANTRI DEDICATES AERONAUTICAL TEST RANGE TO THE NATION

Hon'ble Raksha Mantri Shri Arun Jaitley inaugurated DRDO's newly built Aeronautical Test Range (ATR) at Chitradurga in Karnataka. Addressing a gathering of eminent scientists and defence personnel on the occasion, the Raksha Mantri said, facilities such as the ATR would help in creating conditions for research, which in turn develop the type of human resource in the country required in the field of aeronautical testing.

Complimenting the vital role of the DRDO towards self-reliance and promoting 'Make in India' efforts, Shri Jaitley said the development of the test range would not only cater to the needs of DRDO for testing of indigenously developed aeronautical systems and would also contribute to the development of the region in which Chitradurga is located.

The ATR is the first of its kind range in the country exclusively meant to conduct flight-tests of indigenous unmanned and manned aircrafts, developed by the DRDO including the naval and trainer versions of the Light Combat Aircraft, the unmanned air vehicles Rustom-I and Rustom-II (Tapas); the Airborne Early Warning and Control (AEW&C) systems, air-to-ground weapons, parachutes and aerostats, etc. The Aeronautical Development Establishment (ADE), one of the premier laboratories of the DRDO, has set up this outdoor testing and evaluating facility.

Spread across 4,029 acres, the 28 km perimeter strategic test range envisages a two km runway besides other tracking and control equipment where a rail link to the facility has also been planned. The state-of-the-art Range Control Centre (RCC) houses

the Air Traffic Display System with remote control of radar operations, ATC RF Voice communication System, Ground Telemetry System, Mission Video Distribution and Display System and Range Operational Communication System. The Radar Centre houses Primary Radar and Secondary Surveillance Radar (MSSR). About 200 acres of land outside the technical area is earmarked for a township with a shopping complex, school, hospital and transit facility.

The landmark event was attended by Shri S Thippeswamy, MLA Molakalmuru and Shri Janardhana Swamy former MP, Chitradurga, Dr S Christopher Chairman DRDO and Secretary Department of Defence R&D along with a large number of senior officers of the DRDO, the Armed Forces, civil administration and other invitees.





ARDE CONDUCTS SUCCESSFUL TRIALS OF WEAPON PRECISION GUIDED HIGH SPEED LOW DRAG AIRCRAFT BOMB

Armament Research and Development Establishment, Pune, conducted carriage trials followed by carriage and release trials (CRT) of 500 kg Precision Guided High Speed Low Drag (PGHSLD) aircraft bomb during 22-30 May 2017 at Pokharan Range. Two weapons, one with sensors, telemetry, data logger for carriage trials and other with GPS and telemetry for CRT were carried out by 32 Wing AF Station, Jodhpur.

Two captive sorties with the weapon were conducted for carriage

trials. PGHSLD-500 fitted on station 05/06 was cleared up to flight envelope. The weapon carried KAM-500 data logger and various sensors. All the sensor data was logged and matched with design parameters. No physical looseness or mechanical damage was observed to the weapon after carriage trials.

During release trials, weapon was released from an altitude of 5 km at 900 km/h (TAS) to verify separation performance and to estimate stability. The separation event recorded with high-speed camera, showed safe

weapon separation and no rolling, pitching or yawing dynamics in the vicinity of the aircraft.

The trials were conducted with the help of Aircraft and Systems Testing Establishment (ASTE), Software Development Institute (SDI), Regional Centre for Military Airworthiness (RCMA)-AA, RCMA-Nasik, Office of the Regional Director Aeronautical Quality Assurance (ORDAQA), and Hindustan Aeronautics Limited.

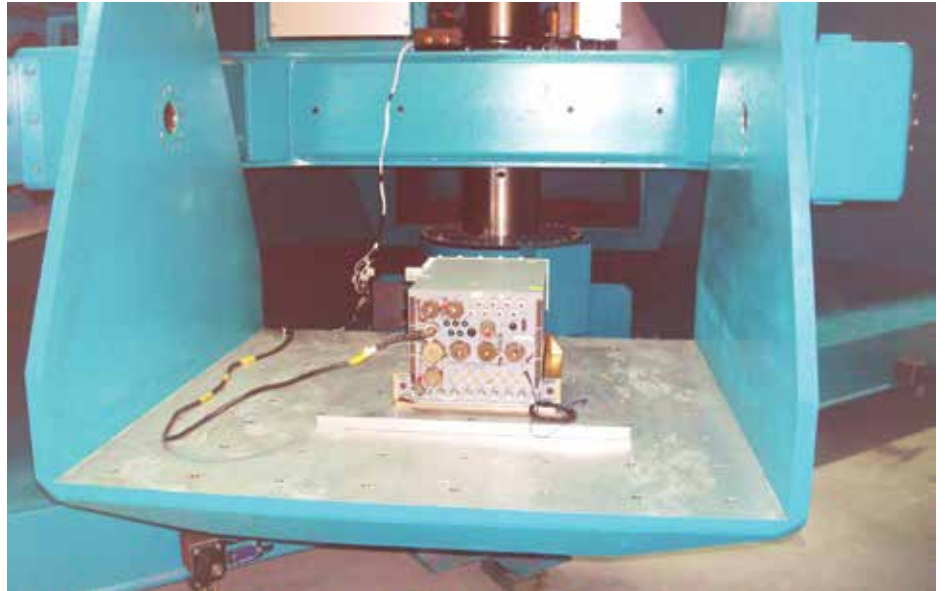


ACCELERATION TEST FACILITY AT LRDE

Steady State Acceleration is one of the mandatory tests as per JSS-5555 and MIL-STD-810 standards for equipment installed in aircraft, helicopters, manned aerospace vehicles, air carried stores and ground launched missiles. This test is required to check the structural integrity and functionality of the components/sub-systems in simulated environment.

A 50 kN capacity centrifuge has been commissioned at Electronics and Radar Development Establishment (LRDE), Bengaluru, to simulate realistic airborne environment in the laboratory condition with provision to carry out functional tests during rotation. The airborne payloads will be tested using electrical slip rings and rotary joints like Ethernet, RF, optical, fluids.

This centrifuge can take payload up to 200 kg and steady state acceleration or centrifugal acceleration up to 75 g



with mounting platform dimensions 1200 mm x 1200 mm x 1200 mm. The centrifuge is having on-board camera to

check functionality of display of the unit under test.

DR CHRISTOPHER INAUGURATES COMPOSITE PROPELLANT MIXING FACILITY

Dr S Christopher, Chairman DRDO and Secretary DDR&D inaugurated the 'Composite Propellant Mixing Facility' required for processing and mixing of raw material for Composite Propellant for Rockets and Missiles on 27 May 2017. Dr Christopher visited HD1.1 Propellant Processing Facility and took keen interest in the Gravitational Mixer developed by HEMRL.

Dr Christopher, reviewed various projects under Armament and Combat Engineering (ACE) Cluster of DRDO. Shri PK Mehta, OS and DG (ACE), Directors of VRDE, Ahmednagar, ARDE, HEMRL and R&DE (E) Pune, attended the review meeting. Senior scientists presented progress made in the ongoing projects.





PHASE III AND IV JOINT TRIALS OF BIO-DIESEL BY ARMY & DRDO COMMENCES

Phase III and IV joint trials of DRDO and Army for utilisation of bio-diesel commenced in June 2017 at 524 ASC Bn and 624 EME Bn in Rajasthan. Scientists from DIBER and VRDE are part of the trial team.

During the phase III trials, endurance of bio diesel powered vehicles and gen-sets would be studied in desert as well as at high altitude. While, desert trials would be conducted in the summer months, high altitude trials would be taken up in coming winter season. Under both the climates, vehicles would run for 8000 km under highway conditions, and 2000 km under cross-country or off-road conditions. DGs would also be run for 700 h under both climatic conditions.



GENDER INTEGRATION & RESILIENCE BUILDING FOR MILITARY OPERATIONS

A kick start technical meeting between Defence Institute of Psychological Research (DIPR) and Defence Science and Technology Laboratory (DSTL), UK, was held from 17-19 May 2017 to facilitate the research

proceedings of "Gender Integration and Resilience Building in Military Operations".

Dr Shashi Bala Singh, DS & DG (LS) chaired the meeting. Director DIPR gave the overview of the projects under

the Indo-UK Collaboration.

The meeting yielded mutual agreements on the key aspects of the joint collaboration.



DRDO DIRECTORS' CONCLAVE 2017

DRDO Directors' Conclave, the annual meet of DRDO Directors, was organized by Naval Physical and Oceanographic Laboratory (NPOL), Kochi, during 13-14 May 2017 to evolve a synergy among DRDO HQ, Technology Clusters, and various laboratories functioning in different parts of the nation. The theme of the conclave was "Strategies for Enhancing DRDO's Effectiveness/Productivity."

Dr S Christopher, Chairman, DRDO and Secretary Department of Defence R&D, inaugurated the conclave and accentuated the achievements of the DRDO and the successful handing over of a number of DRDO products to the Services recently.

Ms J Manjula, DS & DG (ECS) presented an overview of the various technical sessions of the conclave.

The two-day conclave deliberated on DRDO-Academic Interface, IPR, User Interaction, International Cooperation, Procurement Procedures, Best Practices in Financial Aspects in Formulation and Execution of Projects and System Safety. Chairman DRDO dwelled upon the consolidated outcome of the conclave and crucial action points for the future.

Dr Christopher inaugurated a technical exhibition showcasing products and technologies developed by NPOL and released DRDO Publications comprising three monographs published by DESIDOC on Advanced Composite Structures, Composite Armour Materials and Modules, and Image Processing and Computer Vision Algorithms for Defence Research; Second Edition

of the Coffee Table Book, NPOL-65 Glorious Years in Pursuit of Excellence in Underwater Surveillance Technology; Protection of DRDO Data by Directorate of Cyber Security; and Training Calendar 2017-18 by CEPTAM. Dr Christopher also released a 'Brand Video of DRDO' focusing on the products developed by various clusters of DRDO.

Dr Chitra Rajagopal, OS and DG (SAM), proposed the vote of thanks, highlighting the support of DRDO fraternity for the successful realization of the event. Shri S Kedarnath Shenoy, OS and Director, NPOL, also thanked the stakeholders from DRDO HQ for the support and cooperation extended to the Laboratory in organizing the event.

DRDO Young Scientist and Best Performance Awards were distributed by Dr Christopher at the conclave.



WORLD ENVIRONMENT DAY

World Environment Day (WED), held on 5 June every year, is the United Nation's flagship campaign for raising awareness on emerging environmental issues from marine pollution, human overpopulation, and global warming, to sustainable consumption and wildlife crime. WED has grown to become a global platform for public outreach, with participation from over 143 countries annually. The following DRDO labs celebrated WED organising various activities.

CVRDE, Chennai

Combat Vehicles Research and Development Establishment (CVRDE), Chennai, celebrated the day by organising tree plantation campaign. Dr P Sivakumar, DS and Director, CVRDE, inaugurated the campaign by planting a sapling at CVRDE campus and emphasized the need to recreate the green environment at the CVRDE's technical and residential areas after the huge loss of trees due to "Vardha Cyclone" last year. He further advised to continue the planting of sapling every month by the retiring employees.

Shri S Sivakumar, Additional Director, highlighted the theme of this year World Environment Day "Connecting People to Nature" and assured to continue the planting



Connecting People to Nature', the theme for World Environment Day 2017, implored us to get outdoors and into nature, to appreciate its beauty and its importance, and to take forward the call to protect the Earth that we share.

of sapling at CVRDE technical and residential area.

DIBER, Haldwani

Defence Institute of Bio-Energy Research (DIBER), Haldwani, celebrated WED with enthusiasm on 5 June 2017. Dr Hina A Gokhale, OS and Director DoP, and Dr A Gokhale, former DS and Director,

DMRL, were present as special guests during the occasion.

Dr SK Dwivedi, Officiating Director, DIBER, highlighted the importance of the day and said that by default DIBER is dedicated to the protection of environment. The Environment Day programme comprised discussions on 'Prospective Plans of Waste Segregation at Source and its Meticulous Disposal, and Re-use and Recycling. Employees and their families were sensitized about minimization and re-utilization of the waste. Technical interventions for conversion of waste to wealth including to energy were also discussed.

Competitions on 'Innovative Idea for Environment Protection', and 'Friends of Environment' for the most appreciative work carried out for the betterment of environment, were organised to mark the day.

Drawing and slogan competitions and a science quiz were also organized for the children of DIBER employees.



ZERO AVALANCHE CASUALTIES – THE ROAD AHEAD

A two-day workshop on ‘Zero Avalanche Casualties—The Road Ahead (ZACRA-2017)’ was conducted by Snow and Avalanche Study Establishment (SASE), Manali, during 25-26 May 2017. Shri PK Mehta, OS & DG (ACE), DRDO, inaugurated the workshop. Besides DRDO scientists, 30 senior officers from the Army’s Northern, Central, Eastern and Training Commands, Border Roads Organisation, paramilitary forces and disaster management authorities attended the workshop.

In his inaugural address, Shri Mehta accentuated the importance

of the safety of troops in snow covered-border regions. OS and DG (ACE) further emphasised that since avalanches are natural hazards, it is not possible to ensure 100 per cent accuracy in forecasting, yet engineering knowledge of the DRDO and the Army could be synergies to minimise the hazard potentials.

Shri Ashwagosh Ganju, OS and Director, SASE, briefed about the avalanche forecast and engineering solutions being provided by the establishment to the Army. He also apprised about SASE’s work in developing cutting-edge technologies to

reduce casualties in inaccessible snow-bound regions.

The focus of the workshop was to interact with the stake-holders to understand their requirements and deliberate upon the magnitude of the avalanche problem in the Himalayas, constraints in the existing avalanche mitigation techniques and plausible solutions in the light of latest technological developments. The workshop delved upon the exploitation of emerging technologies to reduce avalanche-related casualties due to avalanches in snow-bound areas.





FOUNDATION COURSE IN ORGANISATIONAL BEHAVIOUR

A five-day “Basic/Foundation Course in Organisational Behaviour” was held at Institute of Technology Management (ITM), Mussoorie from 29 May 2017 to 2 June 2017. Shri Sanjay Tandon, Director, ITM, inaugurated the course and emphasized the importance of human

behaviour in achieving success in context of any organizational objective.

The objective of the course was to make the participants understand the impact that individuals, groups and organizational structure have on behaviour within the organization

and how this knowledge would assist in improving the efficiency and effectiveness in the Organization.

The course was attended by 23 DRDS and DRTC officers from various DRDO labs/estts.



COURSE ON ZERO-DEFECT SOFTWARE

Research Centre Imarat (RCI), Hyderabad, conducted a CEP course titled “Towards Zero-defect Software through Re-use and Model driven Development” from 14-16 June 2017.

The objective of the course was to discuss the advanced technologies and methodologies that can be used to achieve defect-free software.

Shri SB Gadgil, OS and Associate Director, RCI, inaugurated the course. Dr Yogananda Jeppu, Principle Systems Engineer, Honeywell Technologies, the Chief Guest and Keynote Speaker, emphasised the importance of software modelling, model-based design, auto code generation and formal methods in developing defect-free software.

Advanced approaches in software

development that tries to achieve zero-defect software through systematic reuse and model driven development were discussed by the speakers in the three days course.

More than 40 scientists from various DRDO labs/estts attended the course. Shri G Vijay Shankar Sc ‘G’, and the Course Director, proposed the vote of thanks.

RURAL DEVELOPMENT PROGRAMME

A workshop for farmers was organized by Defence Food Research Laboratory (DFRL), Mysuru, in association with Spoorthy Janabhivridhi Samashe (NGO) on 10 May 2017 at Karimuddanahalli Village, Hunsur Taluk, Mysuru District under the rural development programme. The village has been adopted by Hon'ble Member of Parliament (Loksabha) Shri Pratap Simha under the Model Village Adoption Scheme.

Various post-harvest technologies pertaining to fruits and vegetables were demonstrated during the workshop. Farmers from Karimuddanahalli and other nearby villages participated in the workshop and were given demonstration for the preparation and preservation of various fruit and vegetable-based products.

Shri Pratap Simha, Dr Rakesh Kumar Sharma, Director, DFRL,

Dr OP Chauhan, Head, Fruits and Vegetables Technology, Dr N Gopalan Head, Planning and Coordination and

other DFRL staff as well as local State Government officials were present during the event.



OBITUARY

Shri Ved Prakash Sandlas, former Distinguished Scientist and Chief Controller R&D (1996-2005), DRDO, passed away on 6 July 2017 in New Delhi. Dr Sandlas joined DRDO in 1986 at Defence Electronics Applications Laboratory (DEAL), Dehradun. During his tenure as Director, DEAL (1986-1996), he was credited with introduction of satellite communications era in the defence services. During these 10 years, DEAL emerged as a major Systems Laboratory of DRDO, specialising in the areas of Image Processing, Millimeter Wave Systems, Missile-Head Seekers, Electronic Surveillance, Telematics and Communication Systems. The high-quality work environment at DEAL was recognised through ISO 9001 certification in 1996



22 February 1945 - 06 July 2017

making it the first DRDO laboratory to achieve this distinction.

Earlier, during 1967-86, he worked at the Vikram Sarabhai Space Centre (VSSC), Trivandrum and grew up to become the Mission/Project Director for the two successful launches of Satellite Launch Vehicle (SLV-3) on 31 May 1981 and 17 April 1983, and Group Director, Electronics (1984-86). He pioneered developments in

the areas of Pulse Code Modulation, Telemetry Systems, Communication Networks, Electromagnetic Compatibility, Electrical Integration and Automatic Checkout Systems.

He was the recipient of DRDO's Scientist of the Year Award (1988) for outstanding contributions to Electronics, FIE Foundation National Award (1998) for Science and Technology, and IIT Kharagpur Distinguished Alumnus Award (2012). He was the distinguished Fellow of Indian National Academy of Engineering (INAE); Institution of Electronics and Telecommunication Engineers (IETE); Astronautical Society of India; and the NGN Forum.

DRDO Newsletter, on behalf of DRDO, pays homage to Shri Ved Prakash Sandlas for serving DRDO with great distinction, dedication and devotion.

VISITORS TO DRDO LABS/ESTTS

DMSRDE, Kanpur

Dr S Christopher, Chairman, DRDO and Secretary DDR&D visited Defence Materials and Stores Research and Development Establishment (DMSRDE), Kanpur, on 4 May 2017 and laid down the foundation stones for Central Lab Complex and Integrated Security Building.

Dr N Eswara Prasad, OS and Director, DMSRDE, presented the status of various ongoing projects at DMSRDE to the Chairman DRDO.



DEAL, Dehradun

Ms J Manjula, DS and DG (ECS), DRDO, visited Defence Electronics Applications Laboratory (DEAL), Dehradun, during 25-26 May 2017. She was informed about various ongoing projects and activities by Dr RS Pundir, Director, DEAL. She was further apprised through lab visit of various projects, e.g., Rustom-2, Software Defined Radio (SDR), GSAT-6 Integrated Coastal Surveillance System (ICSS), Tropo-Scatter Communication, VLF Communication, etc. DG (ECS) appreciated DEAL for developing these high-end communication and surveillance systems.



DFRL, Mysuru

Maj Gen NS Rajpurohit, VSM, DCCI, ASC Centre and College, Bengaluru, visited Defence Food Research Laboratory (DFRL), Mysuru, on 29 May 2017. Dr Rakesh Kumar Sharma, Director, DFRL, presented an overview of the laboratory to the visitor. Technical presentations were made by senior scientists about ongoing projects and theater- and terrain-based food technologies for Armed Forces.



DRDO HARNESSING SCIENCE FOR PEACE AND SECURITY- XVII

CHAPTER 2: TRANSFORMATION—DEFENCE RESEARCH & DEVELOPMENT ORGANISATION (1958-1969)

The article is Seventeenth in the Series of extracts of the monograph, "Defence Research & Development Organisation: 1958-1982", by Shri RP Shenoy, former Director of Electronics and Radar Development Establishment (LRDE).

CONSOLIDATION

Dr Bhagavantam was the head of the Defence R&D Organisation for about eight years. In this period the Organisation went through a process of growth and consolidation. By the time he retired from his post in October 1969, the Organisation had made significant progress on many fronts. Some of the major issues that were addressed and solutions sought are discussed below.

Organisation Structure

The organization structure remained basically the same as it was in 1959 except that additional laboratories came into existence and that a Directorate of Vehicles was formed out of Directorate of Vehicles and Engineering at the Headquarters. The approach was one of caution towards major changes in organizational structure because time had been too short and that there was not enough experience to come to the conclusion that it was ineffective and because any major change to be effected invariably required significant time and effort to negotiate through various government departments. The changes that were effected were mostly adjustments made in the duties and in the delegation of powers at the DRDO Hq and to the Directors of laboratories after a dialogue-discussion process.

The Scientific Adviser had two senior personnel, namely the Chief Controller R&D and the Chief Scientist to assist him in the management of the organisation. The Chief Controller was a very senior Service Officer of the rank of a Major General of the Indian Army. The post of the Chief Scientist was never filled up either during Dr Kothari's period or during Dr Bhagvantam's tenure as Scientific Adviser to the Defence

Minister. Dr V Ranganathan who was earlier appointed as Deputy Chief Scientist continued in that post until he moved to the Cabinet Secretariat. The Controllers under the CCR&D had been re-designated first as Group Directors and later as Technical Directors with more emphasis on coordination than control of laboratories. The important functions for which the Chief Controller was responsible to the Scientific Adviser were, coordination of research and development programmes with the Services, the efficient functioning of the technology-oriented laboratories, general administration of the laboratories, discipline and welfare of the military personnel in the department and operation of the secretariat of the Research and Development Advisory Committee. The CCR&D had five Technical Directors namely Aeronautics, Armament, Electronics, Engineering and Vehicles. In addition, the Director of Administration, the Fire Adviser, the Director of Standardisation, and the Director of Scientific Evaluation Group reported directly to the CCR&D. The laboratories under the CCR&D were, ARDE, ERDL, DMRL, IRDE, DRDL, and TBRL in Armaments; LRDE, SSPL, DLRL and HRPU in Electronics, RDE(E) under Engineering, VRDE, CVRDE under Vehicles; and ADE and GTRE under Aeronautics. The main functions for which the Deputy Chief Scientist was responsible to the Scientific Adviser were, coordination of research in the laboratories, scientific interests of the Ministry and Services Headquarters, formulation of training policy and research programmes in the training institutes, research programmes of the psychological research wing and taking care of the interest and welfare of the scientific staff. The Technical Director of

Research Laboratories and the Directors of Training Institutes reported to the Deputy Chief Scientist. In addition, the laboratories and institutes that reported to the Deputy Chief Scientist were, DRL (Materials), DSL, NCML, INPL, DL (Jodhpur), INMAS, DFRL, DIPAS, DRL (Tags), IAT and DIWS. Each of the Technical Directors coordinated the work of and provided assistance to their corresponding laboratories and acted as link between them and the Services and between them and the CCR&D or the Deputy Chief Scientist as the case may be. The Technical Directors normally acted as a single window agency for the concerned laboratories for most issues concerning projects and also monitored the major projects of the laboratories on behalf of the CCR&D or the DCS. The laboratory Directors usually dealt directly with the Director of Administration in administrative matters and had the option of communicating directly with the CCR&D or the Deputy Chief Scientist as well as the Services, wherever they considered necessary. The CCR&D and the Deputy Chief Scientist apprised the Scientific Adviser periodically and whenever he called for, the status of projects and the major issues that required his attention and action.

With the formation of the DRDO in 1958, the Government of India constituted the Defence Minister's Research and Development Committee, which was presided over by the Defence Minister. The members of the Committee were, the Scientific Adviser, the Chiefs of Staff of the three Services, senior secretariat officers and the Financial Adviser to Defence. It was a policy making body with a very wide mandate to consider any and all aspects that affected the working of the Organization. Later in July 1962, this body was replaced by



the Defence Research and Development Council with the Defence Minister as the Chairman. The membership of the Council was expanded to include in addition to the members of the earlier Committee, Minister of State in the Defence Ministry as Vice Chairman, Additional Secretary Defence, Director General CSIR, Controller General of Defence Production and the CCR&D. The functions of the Defence R&D Council were more specific and included, coordination, direction and review of R&D work undertaken by the laboratories, formulation of programmes for training of DRDO personnel, scrutiny and recommendation of annual budgets of the DRDO for government approval, maintaining liaison with other S&T institutions of the country and implementation of government decisions in all matters concerning R&D. According to Shri Krishna Menon, the Defence Minister at that time, the Council was an autonomous body in a limited sense and had the freedom to function without administrative impediments so that the speedy execution of defence R&D programmes that aimed at developing and producing weapon systems was made possible. To assist the Council in its functioning, a Research and Development Advisory Committee was setup with the Scientific Adviser as the Chairman. Other members were, representative from the Ministry of Finance (Defence), Senior Officers from the three Services, two leading scientists of the country, CCR&D and the Deputy Chief Scientist. The functions of the Advisory Committee were the same as that of the earlier Defence Science Advisory Committee.

Management Style

According to those who worked closely with Dr Bhagavantam, he did not concentrate powers in his hands. The powers of the DG DRDO, which could be delegated down, were passed down to the two principal functionaries, the CCR&D and the Deputy Chief Scientist, and the Scientific Adviser expected them to exercise the delegated powers fully. Powers were also delegated to the Heads of the Laboratories and these were revised periodically after feedback from the laboratories. While most of the problems relating to the running of the laboratories and progressing of the projects were dealt by the CCR&D or the Deputy Chief Scientist, the

Directors of laboratories could utilize the opportunities during their visit to Delhi or during the visit of the Scientific Adviser to their laboratories to inform him of the progress made on major projects, unresolved issues with respect to manpower, facilities and availability of foreign exchange. These occasions provided the Scientific Adviser a fairly up-to-date picture and a first hand view of the work and issues relating to the laboratory and sometimes used these opportunities to convey his views on matters of importance and on issues relating to more than one institution. This provided him time to play his role as a scientist of eminence at the national level, steer the organization in its activities towards applied research and development, decide on the areas of growth and also be an effective spokesperson of the DRDO.

He also made full use of the mechanism of the annual meeting of the Directors of laboratories, with the Scientific Adviser, CC R&D, DCS, Group Directors and the Director of Administration instituted by Shri VK Krishna Menon from the very first year of the creation of DRDO. During these Conferences, which lasted about two to three days, the Organisation as a whole took stock of the work that had been accomplished, review measures to consolidate effort and help formulating policies on major issues and problems of concern and which kept arising from time to time. He and the senior level scientists were also aware that in a conference of this nature where the Directors from very widely varying disciplines attend, more than narrow technology issues, the broader aspects of R&D management, and administrative policies affecting the functioning of the organization need to be aired before decisions could be taken or recommendations made. The published proceedings of these conferences indicate that there was a frank and free exchange of views and identification of common issues that require to be resolved. There was accountability as actions taken on the decisions of the previous conference were brought out, reasons for those not resolved were presented and were kept open for reaction of the directors. Several decisions of importance on policies relating to the organization, planning and implementation of R&D activities, and also on policies related to delegation of powers, administration and management of the laboratories, role of Technical Directors, manpower

planning were taken during these Annual Conferences. For example at the 8th Annual R&D Conference, Dr Bhagavantam announced important decisions about decentralization of responsibility and delegating authority to Directors, revision of Defence Science Service Rules, terms and conditions for Service Officers who opt for permanent absorption in DRDO, initiation of a substantial building plan for the DRDO and a five year financial plan for build up of R&D facilities. The process of participative decision making and the transparency of the process mitigated any feelings of partisanship or bias in decision-making in matters where differences existed and fostered the esprit de corps among the diverse elements of the Organization. Immediately after or preceding the Annual R&D Conference, a symposium on topics of common interest such as Equipment Oriented Research and Development, Management of Research & Direction in Defence, Defence Packaging, Defence Electronics, Optics in Defence, and so on was organized and in addition, an exhibition of products of the laboratories at a particular station was held. The conferences and seminars also brought the civilian scientists and their military counterparts nearer, gave the senior personnel a chance to be in touch with the scientists and technologists as well as technological advances in areas other than theirs, gave them a closer look at the type of work carried out, and promoted a sense of identity among them.

These occasions were also utilised to interact with the Minister and high ranking civil officials. These were necessary to provide a feedback to them regarding the reaction to the rules framed several decades back by the British for status quo of routine maintenance and running of departments and that were ill suited for the type of technological development work undertaken by DRDO. Unlike the other S&T organizations, DRDO had a major constraint of undertaking research and development work within the framework of government regulations. The venue of the conferences was shifted every year among the four cities where there were three or more DRDO establishments, namely, Delhi, Bangalore, Hyderabad and Pune.

To be continued...



Sat, 27 May, 2017
(Online)

DRDO's much-awaited ATR ready for take-off

Come Sunday, an exclusive Aeronautical Test Range (ATR) with a Defence Industrial Complex at Chellakere in Chitradurga district of Karnataka will be on the nation's radar. This multi-agency Defence complex for integrating and testing different Unmanned Air Vehicles (UAV) will cater to the Defence needs. It will be unveiled by Defence Minister Arun Jaitley on Sunday. The ATR built by Defence Research and Development Organisation (DRDO) will have strategic testing ground for UAVs and possibly would be extended to other Defence aeronautical tests, which would include Indian pride Tejus.

The ATR built at a cost of Rs 1,300 crore in Varavoo Kaval near Chellakere will have technical infrastructure on 4,090 acres and transit and residential facilities on 200 acres. It will house multiple agencies under the Defence Ministry.

The ATR is now ready and already they have flown Rustom 1 and Rustom-2 on a 2.2 kms runway in the facility. The facility, once complete, can test naval and trainer versions of the Light Combat Aircraft, Unmanned Air Vehicles Rustom 1 and 2; and the Airborne Early Warning & Control Systems meant for surveillance. The ATR can extend runway for another km to augment testing of Tejus and AEWACS.



Tue, 30 Mar, 2017

More Akash systems for Army

By Dinkar Peri

Defence Acquisition Council bids for indigenously developed missiles

The Defence Ministry has decided to cancel the Army's global contest for Short Range Surface to Air Missile (SR-SAM) systems and instead procure two additional regiments of the indigenously developed Akash missile system. The decision was taken at a meeting of the Defence Acquisition Council (DAC) chaired by Defence Minister Arun Jaitley two weeks ago. The Army is expected to begin inducting the systems by December 2018. "The DAC has cancelled the global buy of two regiments of SR-SAM. The case contained for 5-6 years and trials of certain equipment were conducted. The DAC has now decided to go in with additional Akash systems," a defence source said on Monday.

The Army has a requirement for four regiments of SR-SAMs. It had earlier ordered two Akash regiments and formally began inducting them in May 2015. Two more regiments were meant to be procured by a global tender for which competition was under way between 3-4 global firms.

Of the Akash systems, the first regiment has been inducted and operational and induction of the second regiment will be completed in the next 2-3 months. On the new regiments, the source added, "Lot of improvements have taken place in the vehicles and systems since the initial development. The new system will be operationally more compact and mobile."



Mon, 29 May, 2017
(Online)

DRDO chosen for Rs18,000-cr short-range missile contract

Defence Research and Development Organisation (DRDO) has been selected for a Rs18,000-crore contract to supply short-range missiles to Indian Army. The decision was taken at a meeting of the Defence Acquisition Council chaired by defence minister Arun Jaitley on Saturday. The DAC preferred state-run DRDO over foreign vendors, including from Sweden, Russia and Israel for supply of the Akash surface-to-air missile system, sources said.

Akash missiles can be used for protection against incoming aircraft and unmanned aerial vehicles of the adversaries and the system would be deployed on both the Pakistan and China border, sources said.

The Army, however, is reported to have sought improved missiles that are on par with foreign ones in terms of a few specific systems and equipment. DRDO is reported to have assured incorporation of the systems suggested by the forces. Akash missiles are already being inducted into the Indian Air Force as the missiles have proved their worth.

The selection process has been slow, considering that the three foreign vendors from Israel, Sweden and Russia were in the race for bagging the contract for which the process was initiated in 2011, and trials were held in 2014. While it took nearly seven years for the selection process for a vendor for the air defence system to conclude, DRDO has also lagged behind in the indigenously development of aircraft and land warfare systems. However, the development of a range of strategic missile systems by DRDO has helped improve the capabilities of the armed forces while also saving precious foreign exchange.

The Army wanted two regiments of the missile system to be provided to the army air defence, which has been operating with obsolete equipment for a long time, with the government itself saying that around 98 per cent of it was outdated. The cabinet committee on security has already cleared a Rs17,000-crore Medium Range Surface to Air Missile project with Israel.



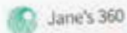
Sat, 03 June, 2017

PRITHVI-II TEST-FIRED

350 km
Strike range
500-1,000 kg
Warhead capacity
9 metre
Height
2003
Induction year



India on Friday successfully test-fired its indigenously developed nuclear-capable Prithvi-II missile from a test range in Odisha as part of a user trial by the Army. The trial of the surface-to-surface missile was carried out from a mobile launcher from launch complex-3 of the Integrated Test Range at Chandipur near Balasore at 9.50 am. The trial was successful and mission objectives were met, said sources. Prithvi-II is thrusted by liquid propulsion twin engines and uses advanced inertial guidance system with manoeuvring trajectory to hit its target with precision and accuracy. The entire launch activities were carried out by specially formed strategic force command.



Wed, 07 June, 2017

Indian DRDO-designed QRSAM successfully tested

By Rakul Bahl

India's state-owned Defence Research and Development Organisation (DRDO) tested the indigenously designed quick-reaction surface-to-air missile (QRSAM) system on 4 June from the Integrated Test Range (ITR) in Chandipur on the country's east coast.

Official sources said that the system, which is being developed for the Indian Army (IA) in tandem with public sector companies Bharat Dynamics Limited and Bharat Electronics Limited, successfully engaged an aerial target during the developmental trials.

They said the missile fired by the QRSAM system, which uses a solid-fuel propellant and has a stated strike range of 25-30 km, was launched from a truck-mounted canister. The range to which the missile was tested was unclear, however, as the DRDO spokesman declined to comment on the test-firing.



Tue, 13 June, 2017
(Online)

DRDO successfully test-fires 'Nag' missile

Jaipur: The Defence Research and Development Organisation (DRDO) today successfully test fired anti-tank missile 'Nag' in a desert in the western sector of Rajasthan. "The missile successfully destroyed the target in today's mission," defence sources said. The "fire and forget" third generation anti-tank guided missile 'Nag' is equipped with the highly advanced Imaging Infrared Radar (IRR) seeker with integrated avionics, technology which is possessed by very few nations, sources said.

The tests, which were witnessed by scientists from the DRDO, Defence Lab, Jodhpur, senior officials from armed forces among others, concluded today. G Satheesh Reddy, the scientific adviser to the defence minister and DG (missiles and strategic systems), who also witnessed the launch, said the successful flight test has strengthened the country's defence capabilities.

DRDO chairman Dr S Christopher congratulated the team who were a part of the mission.



Wed, 14 June, 2017

छद्म टारगेट को हिट कर साधा अचूक निशाना

'नग' मिसाइल का ट्रायल

पोखरण फील्ड फायरिंग रेंज में 4-5 दिन चलेगा परीक्षण

जयपुर, (विमल भौरव): फायर एण्ड फोर्गेट वाली थर्ड जेनरेशन एंटी टैंक 'नग' मिसाइल के अपग्रेड वर्जन प्रोमोपेना के लीड अर्थ क्वॉल का मंगलवार को पोखरण फील्ड फायरिंग रेंज में परीक्षण किया गया। यह परीक्षण 4-5 दिन चलेगा। सूची के अनुसार पोखरण रेंज में शुरू परीक्षण में मिसाइल से दुश्मन के छद्म टारगेट को हिट कर अचूक निशाना साधा। मिसाइल के इमेजिंग इन्फ्रारेड सीकर



नग मिसाइल।

में और सुधार किया गया है, जो कि उसे छद्म टारगेट को हिट करने के लिए गाइड करते हैं। गत वर्ष इन्फ्रारेड सीकर को टारगेट और इसका आगमन के इलाकों को गं

तपमान में पहचान करने में कुछ दिक्कत आ रही थी। इसलिए इस मिसाइल में अब डबल मिस्सेटिव डिटेक्टर्स लाने गए जो कि हीट और इन्फ्रारेड मिशन को भाग सके।

दुश्मन का पीछा कर तबाह कर देती है

डीआरडीओ के सूत्रों ने बताया कि दमो और भूत जाओ वाली इस मिसाइल की कई खूबियां हैं, जिसमें इमेज के जरिये सेंकें मिलने पर इसे दमन के बाद ये दुश्मन के टैंक का पीछा करते हुए उसे तबाह कर देती है। इस मिसाइल को घाटी पर या एक से दूसरी जगह ले जाया जा सकता है। इस मिसाइल में इमेजिंग इन्फ्रारेड आईआईआर लगा होता है जो कि टारगेट हिट करने पर गाइड करता है भले ही टारगेट चलतागमन हो।

गत वर्ष सफल नहीं हुए थे ट्रायल

गत वर्ष मिसाइल के चार किलोमीटर रेंज के ट्रायल सफल फील्ड फायरिंग रेंज में हुए थे, लेकिन यह ट्रायल सफल नहीं हुए थे, इसके कारण इस बार इसकी रेंज घटाकर 3 से 3.2 किलोमीटर तक की गई है। जीतना चाहते हैं कि सफल फील्ड में परीक्षण किए गए थे, उसमें वर्मिन टारगेट सिस्टम टीडीएस का इस्तेमाल किया गया था, जो कि जोधपुर की सेना प्रयोगशाला में विकसित किया गया था।

350 करोड़ से ज्यादा का बजट

सूत्रों ने बताया कि मिसाइल को सेना की आरबी प्रयोगशाला जेदरावाद में विकसित किया है, इस पर अब तक 350 करोड़ से ज्यादा का बजट लगा चुका है। इस मिसाइल को दिन और रात इस्तेमाल किया जा सकता है।